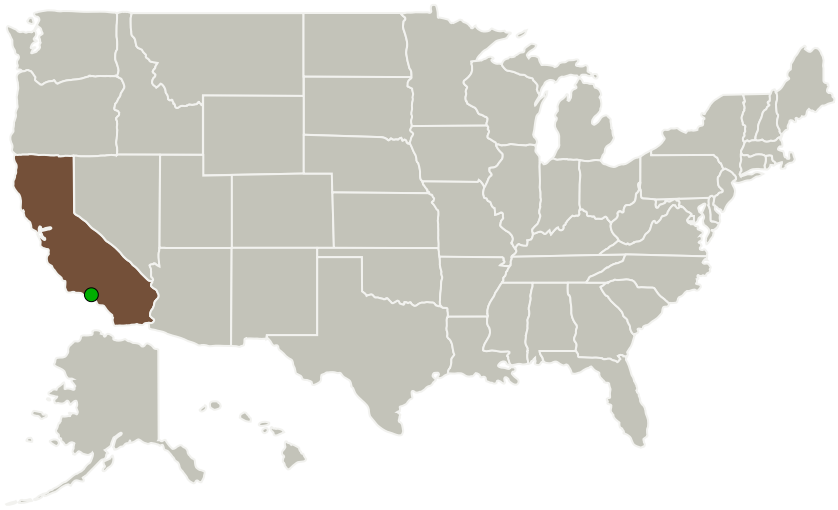
Luminescent Sensors for Ocean Water Monitoring, Phase I

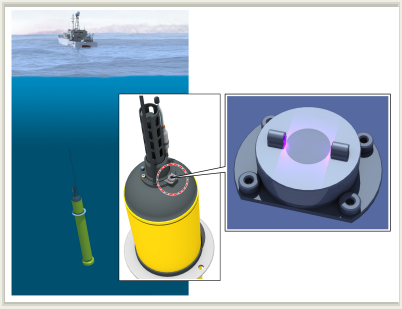
Completed Technology Project (2017 - 2017)

Project Introduction

Space-based global measurements of atmospheric CO2 must be complemented with ocean water analysis. Monitoring ocean acidification, which results from the accumulation of CO2, is of critical interest, since progressive acidification is already affecting oceans and coastal estuaries and waterways. To that end, NASA and NOAA are seeking in-situ monitoring devices for oceanic and coastal water monitoring, including a pH sensor for seawater, to support space-based monitoring programs. Monitoring ocean pH accurately over large areas has proved to be extremely difficult, and classic sensor technology, based on potentiometric measurements (pH electrodes), have shown significant limitations: current instruments are expensive, do not monitor pH directly, and therefore need complex signal compensation to yield accurate measurements, and require frequent calibration. Intelligent Optical Systems proposes to develop a novel luminescent sensor for pH, taking advantage of novel materials developed to monitor pH and other parameters of interest in high salinity and elevated pressure environments; it will exhibit high selectivity (direct pH measurements) and stability. A novel antifouling technology with no mechanical parts will prevent sensor degradation in seawater. To contain the cost of the electronics while maintaining high performance in detecting the luminescent signal, we will use Circuit Seed circuits, which process analog signals on 100% digital components. This enables them to reduce size and parts count, simplifying quality control and power requirements, and will enable us to produce high-performance, low-cost optoelectronic units.

Primary U.S. Work Locations and Key Partners





Luminescent Sensors for Ocean Water Monitoring, Phase I Briefing Chart Image

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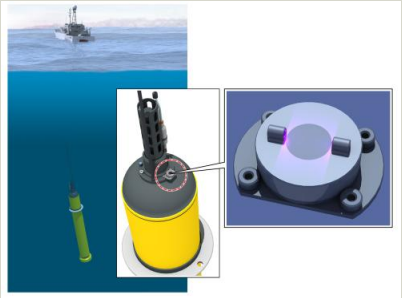
Organizations Performing Work	Role	Type	Location
Intelligent Optical Systems, Inc.	Lead Organization	Industry	Torrance, California
Jet Propulsion Laboratory(JPL)	Supporting Organization	NASA Center	Pasadena, California

Primary U.S. Work Locations
California

Images



Briefing Chart Image
Luminescent Sensors for Ocean Water Monitoring, Phase I Briefing Chart Image
(https://techport.nasa.gov/image/131161)

Organizational Responsibility

Responsible Mission Directorate:
Space Technology Mission Directorate (STMD)

Lead Organization:
Intelligent Optical Systems, Inc.

Responsible Program:
Small Business Innovation Research/Small Business Tech Transfer

Project Management

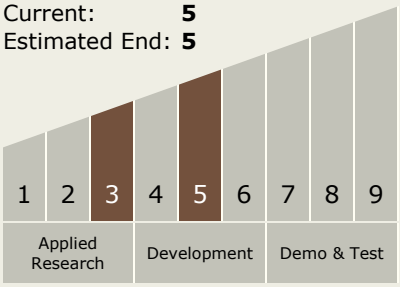
Program Director:
Jason L Kessler

Program Manager:
Carlos Torrez

Principal Investigator:
Jesus D Alonso

Technology Maturity (TRL)

Start: **3**
Current: **5**
Estimated End: **5**



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Technology Areas

Primary:

- TX08 Sensors and Instruments
  - TX08.3 In-Situ Instruments and Sensors
    - TX08.3.4 Environment Sensors

Target Destinations

The Moon, Mars, Outside the Solar System, The Sun, Earth, Others Inside the Solar System